

REMARKS

Applicants amend claims 1, 8, 20, 22 and 24 as indicated above. Support for the amendments can be found on page 5 and throughout the remainder of the specification. Thus, no new matter is added. As discussed in detail below, the application is believed to be in condition for allowance.

Allowed Claims

Applicants acknowledge with appreciation the allowance of claims 10-13.

Allowable Claims

In the Office Action Summary, objections are raised with respect to claims 8 and 9. However, in the body of the Office Action, the Examiner indicates that claims 8-13 are allowed. Because claim 8 depends on claim 1, which is rejected as being obvious as discussed below, Applicants interpret the above references to claim 8 as an indication that this claim is allowable if rewritten in an independent format to include the features of claim 1. Accordingly, claim 8 is now presented in independent format, and is believed to be in condition for allowance.

Rejections Under 35 U.S.C. 103

The Office Action rejects claims 1, 6, 7 and 20-25 as being obvious over U.S. Patent No. 6,313,014 of Sakaguchi and U.S. Patent No. 6,506,662 of Ogura.

Claim 1, as amended, recites a method of processing a silicon substrate that includes the steps of evacuating a vacuum chamber in which the substrate is placed to a first pressure, and introducing a fluid other than molecular oxygen into the vacuum chamber as a background fluid. Subsequently, a plurality of ions are implanted into the substrate by *applying an ion beam thereto*, in the presence of the background fluid, to form a buried oxide layer under a top silicon layer. The fluid inhibits formations of threading dislocations in the top silicon layer for reducing a defect density of the processed substrate.

As noted in the response to the previous Office Action, Sakaguchi does not teach implanting ions in a silicon wafer *in the presence of a background fluid* that can inhibit formation of threading dislocations in the top silicon layer. Rather, Sakaguchi is directed to a

method of fabricating an SOI substrate by initially heat-treating a silicon substrate in a reducing atmosphere containing hydrogen and then subjecting the substrate to ion implantation and annealing to generate therein a buried oxide (BOX) layer. Notably absent, however, is any suggestion in Sakaguchi of performing the ion implantation step in the presence of the hydrogen-containing atmosphere.

Ogura does not bridge the gap in the teachings of Sakaguchi to render the claimed subject matter obvious. In particular, Ogura does not teach, or suggest, implanting ions in a silicon substrate while the substrate is exposed to a background fluid. Applicants respectfully disagree with the Examiner's assertion that Ogura, in a non-preferred embodiment, teaches implantation of oxygen ions in the presence of a fluid. In the passage at column 7, lines 11-12, to which the Examiner refers, Ogura indicates that it is "important that the plasma chamber vacuum container 10 and the reaction chamber 30 are separated by the acceleration electrodes 20..." Ogura continues to state that if *contrary* to its teachings, the silicon substrate is placed in the plasma chamber, it is difficult to obtain an abrupt interface between the insulating film and the overlying silicon layer.

As an initial matter, contrary to the Examiner's assertion, this passage of Ogura does not describe a less preferred embodiment of its teachings. Rather, it is directed to a method that *deviates* from Ogura's teachings. In fact, Ogura specifically indicates that placement of the silicon substrate in the plasma chamber is *contrary* to its teachings. In other words, in this passage, Ogura does not describe another embodiment, albeit a less preferred one, but rather admonishes against removing the separation between the plasma chamber and the reaction chamber.

Further, even if one assumes that Ogura's teachings extend to an embodiment in which the silicon substrate is placed in the plasma chamber, such an embodiment still fails to provide the subject matter of amended claim 1. In particular, claim 1, as amended, recites that the ion implantation is achieved by *applying an ion beam* to the substrate. In contrast, placing the substrate in the plasma chamber of Ogura does not expose the substrate to an *ion beam*, as such a beam is formed by the acceleration electrodes separating the plasma chamber from the reaction

chamber. In other words, the ions present in the plasma chamber do not form an ion beam but rather exhibit random energies and trajectories.

Accordingly, claim 1 and claims 6 and 7, which depend on claim 1, distinguish patentably over the combined teachings of Sakaguchi and Ogura.

The arguments presented above similarly apply to establish that independent claims 20, 22 and 24 are also patentable over the cited art. In particular, similar to claim 1, each of these claims recites implanting ions into a silicon substrate by applying an *ion beam* thereto in the *presence of a background fluid* – features not taught by Sakaguchi or Ogura. Hence, claims 20, 22 and 24 and claims 21, 23 and 25, each of which depends on one these claims, are patentable over the combined teachings of Sakaguchi and Ogura.

CONCLUSION

In view of the above amendments and remarks, Applicants respectfully request reconsideration and allowance of the application. Applicants invite the Examiner to call the undersigned if there are any remaining questions..

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